

## ***Compressed Gas Cylinders***

# **BP WIND ENERGY OPERATIONS POLICIES AND PROCEDURES**

## **Compressed Gas Cylinders**

[Document Control Details](#)

## **Compressed Gas Cylinders**

### **1.0 Purpose/Scope**

- 1.1 The purpose of this procedure is to establish the requirements for the prevention of injuries and illnesses to employees who handle, store or use compressed gas cylinders.
- 1.2 This procedure applies to all employees and on-site contractors engaged in activities occurring on BPWE sites.

### **2.0 Reference**

- 2.1 Occupational Safety and Health Administration; OSHA Standard [29 CFR 1910.101](#), Subpart H 'Compressed Gases (General Requirements).'
- 2.2 Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910. [166](#), [167](#), [168](#), 170, Compressed Gases,
- 2.3 Occupational Safety and Health Administration (OSHA) Standard 29 CFR [1910.242](#), and [252](#)
- 2.4 Department of Transportation; [49 CFR 173.34](#)

### **3.0 Responsibilities**

- 3.1 All Users – Before storing and/or handling Compressed Gas Cylinders:
  - A. Be familiar with and adhere to all requirements contained in this procedure,
  - B. Review Material Safety Data Sheet (MSDS) to identify all hazards.
- 3.2 Facility/Project Managers
  - A. Verify all requirements of this procedure are implemented and enforced.
  - B. Ensure that compressed gas cylinders are stored in a safe manner and in accordance with this procedure.

### **4.0 Acronyms**

#### **Acronyms Table**

Acronym	Definition
AGT	Authorized Gas Tester
DOT	Department of Transportation
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment

## Compressed Gas Cylinders

### 5.0 Procedure

#### 5.1 Storage Location

- A. Every attempt should be made to store a minimum amount of compressed gasses.
- B. Compressed gas cylinders stored on BPWE premises will be stored in a designated storage area. The storage area will be maintained in accordance with this procedure.
- C. Compressed gas cylinders in use on a project will be stored in accordance with the requirements of this procedure in an area designated by the appropriate Site/Project manager.
- D. When cylinders are not in use, e.g. overnight, weekends, etc, they will be returned to the appropriate designated storage area.

#### 5.2 General Storage Requirements

- A. When compressed gas cylinders are stored in storage racks, signs designating the contents of cylinders to be stored in each rack as well as “empty” and “full” signs are required. Signs should be clearly visible from all approach directions reading:

“DANGER”  
“NO SMOKING OR OPEN FLAMES”

- B. Storage racks must have intermediate chains so that multiple cylinders can be secured.
- C. In situations where gas cylinders must be stored outside of a storage rack, they must be securely chained in the upright position to prevent damage due to being knocked over or from falling or passing objects. Cylinders shall not be secured to scaffolding.
- D. Compressed gas cylinders shall be stored in a well-ventilated area. They shall not be stored in unventilated enclosures such as lockers and cupboards.
- E. Empty cylinders shall be marked “EMPTY”.
- F. A fire extinguisher, rated at least 10A, 60BC, should be located between 25’ and 75’ away from the rack.
- G. Oxygen cylinders in storage must be separated from fuel gas cylinders or any combustibles, especially oil and grease, by 20 feet or by a 5-foot high fire wall with a fire resistance rating of ½ hour.
- H. Valve protections caps must be in place at all times when regulators or gauges are not connected or when cylinders are being moved.
- I. Compressed gas cylinders must be kept away from locations where they may be subjected to high temperatures, sparks or flames (including contact with electrical circuits).
- J. Compressed gas cylinder content markings shall be maintained in a legible condition as they were upon arrival.

## Compressed Gas Cylinders

### 5.3 Accepting Cylinders from Vendors or Contractors

The following apply to vendors who are delivering compressed gasses or contractors who are bringing compressed gasses onto a BPWE site:

- A. The contents of cylinders must be identified with decals, stencils, or other markings on the cylinders. Color codes alone or tags hung around the necks of the cylinders are not acceptable.
- B. Must have been prior approved by the Facility/Project Site Manager and MSDS on file.
- C. Cylinders lacking proper identification must not be accepted from vendors or allowed on site by contractors.
- D. Cylinders must not be accepted from vendors or contractors unless the valve safety covers are in place and properly tightened.
- E. Cylinders transported by vehicle shall be securely fastened in an upright position so they can not fall or strike each other. Valve protection caps must be in place.

### 5.4 Requirements For All Compressed Gasses

- A. All oxygen/acetylene cutting torches shall have a flashback arrestor installed in each regulator, and a check valve installed on each torch/hose connection.
- B. Caps used for valve protection should be kept on the cylinder except when the cylinder is in use. A cylinder's cap should be screwed all the way down on the cylinder's neck and should fit securely. The cap is for valve protection only.
- C. Always have an appropriate MSDS available and be familiar with the health, flammability, and reactivity hazards for the particular gas.
- D. Proper personal protective equipment (PPE) shall be worn.
- E. Connections and couplings used with compressed gas cylinders shall be rated for the pressure and material in the cylinders.
- F. If a cylinder is damaged, in poor condition, leaking, or the contents are unknown, contact your cylinder vendor and have the cylinder removed from the site. Have the vendor return the damaged cylinder to the manufacturer.
- G. Labels describing the contents of gas cylinders should be clearly labeled with the gas identity and appropriate hazards. Color-coding is **not** a reliable means of identification. Cylinders that do not bear a legibly written, stamped, or stenciled identification of the contents should not be used. They should be returned to the vendor as soon as possible.
- H. Oxygen cylinders will not be stored near highly combustible material, especially oil or grease, or near reserve stocks of carbide or acetylene.
- I. Oxygen cylinders in storage shall be separated from fuel gas cylinders such as acetylene, or other combustible materials. A minimum distance of 20 feet is required for separation, or a non-combustible barrier at least 5 feet high with a fire resistance rating of at least one-half hour will be established.
- J. Compressed gas cylinders shall be legibly marked with either the trade name or chemical name of their contents. Whenever practical, the marking shall be on the shoulder of the cylinder.
- K. Cylinder valves shall be closed before moving cylinders.
- L. Valve protection caps shall **not** be used for lifting cylinders from one vertical position to

## Compressed Gas Cylinders

another.

- M. Cylinders shall **not** be placed where they might become part of an electric circuit.
- N. Compressed gas cylinders shall be hydrostatically tested every five years, with the following exceptions:
  - Cylinders that have a star stamped next to the last hydrostatic test date may be tested every 10 years instead of 5, if they meet certain DOT criteria. Verify that your cylinder meets these criteria with the cylinder supplier.
  - Lightweight wrapped aluminum cylinders must be hydrostatically tested every three years and steel cylinders every five years. The dates shall be stamped on the cylinder itself. These records are maintained by the local supplier of the cylinders.
- O. Utility stations and other gas cylinders that may be connected must be equipped with unique couplings to avoid inadvertent connection of the wrong cylinders.
- P. Breathing air cylinders must be refilled in accordance with the Respiratory Protection practice. Under no circumstances shall breathing air cylinders be refilled with shop or facility air.

### 5.5 Compressed Air Only

- A. Compressed air shall only be used for cleaning parts when no other means are acceptable.
- B. All compressed air outlets used for parts cleaning will be regulated to no greater than 30 pounds per square inch (psi) and a sign shall be posted designating so, or a cleaning tip that is self-regulating to 30 psi must be utilized.
- C. Before using compressed air for parts cleaning, verify that debris will not be blown onto someone else. If necessary, cover nearby equipment with a canvas to prevent damage from debris.
- D. Compressed air shall never be used for cleaning clothes or body parts.
- E. Eye and face protection shall be worn to prevent injury from flying particles.
- F. Before operating an air hose, examine all connections to verify they are tight and will not come loose under pressure. Hold the nozzle when turning air on or off.
- G. Do not kink a hose to stop the airflow. Always turn air off at the control valve.
- H. Check hoses regularly to verify that they are in good condition.
- I. Never use hoses to raise or lower or pull tools.
- J. Hoses shall be coiled and stored when not in use. Hoses shall not be left uncoiled where they can become a tripping hazard.
- K. Never point a compressed air nozzle at another person.

### 5.6 Handling Requirements and Moving Cylinders

- A. Always use a suitable hand truck or similar device; the cylinder must be firmly secured for transporting and unloading. Do not roll or drag a cylinder to move it or allow cylinders to strike each other or any other surface violently.
- B. Protective valve caps must be secured when moving cylinders. Do not lift or move the cylinder by the cap.

## Compressed Gas Cylinders

- C. Ropes or slings should not be used to suspend cylinders unless the vendor has made provisions for such lifting and attachment points are provided on the cylinder.
- D. Regulators shall be removed when moving cylinders, when work is completed, and when cylinders are empty.
- E. All cylinders carried in motor vehicles must be transported in a secure upright position in a DOT compliant transportation rack.
- F. All cylinders carried in motor vehicles must be transported in a secure upright position in a DOT compliant transportation rack.
- G. All cylinder storage areas must be prominently marked with the hazard class or the name of the gases to be stored (e.g., Flammable Gas Storage Area, and 'No Smoking' signs posted where necessary).
- H. Always secure gas cylinders upright (with valve end up) to a wall, cylinder hand truck, cylinder rack or post, unless the cylinder is specifically designed to be stored otherwise.
- I. Mark empty cylinders 'EMPTY.'
- J. Cylinders shall be stored in a well-ventilated area away from sparks, flames or any source of heat or ignition. Cylinders may be stored outside on an even surface; however, where extreme temperatures prevail, cylinders should be stored so that they are not in the direct rays of the sun. Do not expose cylinders to temperatures above 125°F.

### 5.7 Using Cylinders

- A. Before using a gas, read all label information and the MSDS associated with the use of that particular gas.
- B. Before attaching cylinders to a connection, be sure that the threads on the cylinder and the connection mate are of a type intended for gas cylinders. Make sure the regulator threads and mating surfaces are clean before the regulator is attached.
- C. Use the proper regulator for the gas in the cylinder.
- D. Attach the regulator securely with the secondary valve closed and preferably with the regulator flow backed off (counterclockwise) before opening the cylinder valve.
- E. Do not permit oil or grease to come in contact with cylinders or their valves, especially cylinders containing oxidizing gases.
- F. Open cylinder valves slowly. Point the valve opening away from yourself and others. Never use a wrench or hammer to open or close a hand wheel type cylinder valve. Return cylinders to the vendor if the valve is frozen and cannot be operated by hand.
- G. Before a regulator is removed from a cylinder, close the cylinder valve and release all pressure from the regulator.
- H. Safety devices and valves should not be tampered with or repairs attempted.
- I. When a special wrench is required to open a cylinder or manifold valve, the wrench should be kept in place on the valve stem when in use; this precaution is taken so the gas supply can be shut off quickly in case of an emergency; and that nothing can be placed on top of a cylinder that may damage the safety device or interfere with the quick closing of the valve.
- J. Fire extinguishing equipment should be readily available when combustible materials

## Compressed Gas Cylinders

can be exposed to welding or cutting operations using compressed cylinder gases.

### 5.8 Special precautions when using oxidizers, flammable, combustible or potentially toxic gases inside turbine towers, nacelles, rotor hubs or blades.

These types of compressed gases pose potentially serious or fatal hazards to workers inside confined spaces. For work that requires the use of such gases inside the areas listed above, the following requirements and precautions shall be taken:

- A. The space, e.g., tower or nacelle, will be classified as a permit required confined space. A confined space permit must be obtained for this work. All provisions of a Permit Required Confined Space Entry will be followed.
- B. An additional permit: either Hot Work (i.e., Oxygen/Acetylene Torch ) or Cold Work (i.e., Argon, Nitrogen, MAP, etc.) will be obtained that details the type of compressed gas, the size/amount of gas being used and any particular precautions (based on the MSDS information) to be followed.
- C. Atmospheric monitoring will be maintained continuously while the compressed gas is in use in these or other confined space areas.
- D. If the compressed gas cylinder is left inside any of these locations during breaks, lunch, overnight or during any other absence that leaves the space unmonitored, the area will be rechecked for gas emissions and the work re-authorized by an Authorized Gas Tester (AGT).
- E. If compressed gas cylinders must be left inside any of these locations for any reason, the cylinder's control valve will be closed, hose(s) removed and the protective cap fully placed on the cylinder. If this cannot be done, the cylinder **MUST BE REMOVED FROM THE SPACE** to protect personnel who will be entering the space after the space has been unmonitored for any length of time.
- F. At all times compressed gases are used inside these spaces, the bottom tower door and the top nacelle hatch cover shall be fully open to promote natural ventilation of the space. If the compressed gas is to be used inside the rotor hub or rotor blades, an HSE Professional or Supervisor who is an 'OSHA Designated Competent Person' or equivalent is required to setup and manage the work.

### 5.9 Special Precautions When Using Flammable Gasses

In addition to the above guidelines, the following measures should be taken when handling flammable gasses:

- A. Cylinders containing flammable gases (empty or full) should be separated from cylinders containing oxidizing gases, as noted above.
- B. Do not store flammable or oxidizing gases near highly flammable solvents, combustible materials or near unprotected electrical connections, gas flames or any other source of ignition.
- C. Store cylinders in a well-ventilated space.

## **Compressed Gas Cylinders**

### **5.10 Special Precautions When Using Poisonous Gasses**

Common poison or highly toxic gasses include: arsine, ethylene oxide, hydrogen cyanide, nitric oxide, and phosphine.

In addition to the above guidelines, the following measures should be taken when handling poison gasses:

- A. Poison gases must be stored in a well-ventilated enclosure.
- B. Flow restrictors are required on most poison gas cylinders.
- C. The quantity of poison gases should be kept at a minimum.

### **5.11 Special Precautions When Using Oxygen and Oxidizing Gasses**

In addition the above guidelines, the following measures should be taken when handling oxidizing gasses:

- A. Do not permit oil or grease to come in contact with oxidizing gas cylinders or their valves.
- B. Cylinders containing oxygen or oxidizing gases (empty or full) should be separated from cylinders containing flammable gases, as noted above.
- C. Do not store oxidizing gases near flammable solvents, combustible materials or near unprotected electrical connections, gas flames or other sources of ignition.

## **6.0 Training**

- 6.1 All personnel working with compressed gas cylinders shall be properly trained in accordance with this HSSE procedure.

## **7.0 Audit/ Inspection**

- 7.1 Cylinder storage areas should be inspected at least once daily by the responsible line manager or delegate.
- 7.2 Inspection of compressed gas cylinder storage areas should include a visual observation to ensure all requirements of this procedure are being met.
- 7.3 Any deviations should be corrected immediately by the responsible line manager.

## Compressed Gas Cylinders

### Document Control Details

<b>Document Name</b>		Compressed Gas Cylinders			
<b>Scope</b>		BP Wind Energy			
<b>Document #</b>		HSSE 27.10.01		<b>Issue Date</b>	
<b>Revision Date</b>				<b>Next Review</b>	
<b>Authority</b>		Matt Sakurada	VP Operations and Asset Management	<b>Custodian</b>	Dale Smith HSSE Advisor Operations
Rev#	Revision Date	Revision Detail		Authority	Custodian